

THE HONOURABLE ASSISTANT COMMISSIONER FOR PATENTS

Page 2

- ☐ Please charge our Deposit Account No. _____ in the amount of \$ _____. A duplicate copy of this sheet is enclosed.
- ☒ A check in the amount of \$1270.00 is enclosed to cover the filing fees and assignment recordal fee.
- ☒ The Commissioner is hereby authorized to charge payment of the following fees associated with this communication or credit any overpayment to Deposit Account No. 19-2548. A duplicate copy of this sheet is enclosed.
- ☒ Any additional filing fees required under 37 CFR 1.16.
- ☒ Any patent application processing fees under 37 CFR 1.17.
- ☒ The Commissioner is hereby authorized to charge payment of the following fees during the pendency of this application or credit any overpayment to Deposit Account No. 19-2548. A duplicate copy of this sheet is enclosed.
- ☒ Any patent application processing fees under 37 CFR 1.17.
- ☐ The issue fee set in 37 CFR 1.18 at or before mailing of the Notice of Allowance, pursuant to 37 CFR 1.311(b).
- ☒ Any filing fees under 37 CFR 1.16 for presentation of extra claims.

Respectfully submitted,



Ronald D. Faggetter
Registration No. 33,345

SMART & BIGGAR
438 University Avenue
Suite 1500, Box 111
Toronto, Ontario
Canada M5G 2K8

Telephone: (416) 593-5514
Facsimile: (416) 591-1690

September 28, 2000
Enclosures
(91436-284 RDF/kek)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the application of:)
John Lynch et al.) Group Art Unit:
Serial No.:) Examiner:
Filed:) Attorney Docket: 91436-284
For: MEDIA GATEWAY CONNECTION)
INFORMATION RECOVERY)

Assistant Commissioner for Patents
Washington, D.C. 20231
USA

Dear Sir:

PTO Customer No.: 22463

PRELIMINARY AMENDMENT

Please amend the application as follows:

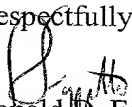
In the Disclosure:

On page 5, line 22 please delete [102C] and insert -- 104C --.

Remarks:

The disclosure has been amended at page 5 to correct a typographical error.

Respectfully submitted,


Ronald B. Faggetter
Registration No. 33,345
SMART & BIGGAR
438 University Avenue
Suite 1500, Box 111
Toronto, Canada M5G 2K8

Telephone: (416) 593-5514
Facsimile: (416) 591-1690

September 28, 2000
RDF/CCC-91436-284

APPLICATION
FOR
UNITED STATES LETTERS PATENT

TITLE: MEDIA GATEWAY CONNECTION
INFORMATION RECOVERY

APPLICANT: John C. LYNCH, Pierre COUILLAUD, and
Metodej E. VALENTIK

MEDIA GATEWAY CONNECTION INFORMATION RECOVERY

FIELD OF THE INVENTION

The present invention relates to media connections over data networks and, more particularly, to recovery, from media gateways, of connection information.

5 BACKGROUND OF THE INVENTION

Increasingly, the Internet and other packet-based networks are being employed to provide telephony services ranging from a simple voice call between two parties to complex video conferencing between multiple geographically distant parties.

10 In a typical packet-based telephony session, a party at one endpoint (a calling telephone) picks up a handset (or otherwise causes the calling telephone to go "off-hook") and enters a destination number for another endpoint (a called telephone). The off-hook condition of the calling telephone is sensed by a local media gateway that is connected to a packet-based data network. The entered destination number is passed over the data network from the local media gateway to a call server (which may also be called a connection
15 manager) that supports the local media gateway. The local media gateway is effectively a "dumb slave" device under control of the call server. After consulting a table that associates destination numbers with data network addresses, the call server communicates over the data network with a remote media gateway associated with the called telephone and instructs the remote media gateway to cause the called telephone to ring. If the remote media gateway
20 reports back to the call server success in causing the called telephone to ring, the call server instructs the local media gateway to play a ring tone on the calling telephone. The call server subsequently sends signaling to the data network to set up a call path (generically, a media path) between the local media gateway and the remote media gateway to carry bi-directional data traffic between the calling telephone and the called telephone.

25 If the called telephone is answered, the call path through the data network (established by call server signaling) may be activated. Once the call path has been activated, communication between either of the media gateways and the call server is generally not required until the call is complete and each of the telephones is returned to an "on-hook" condition. Upon the completion of a call, the call server receives an indication of the

completion from each of the media gateways. As the call server has a record of the time of the beginning of the call and the end of the call, a complete record of the call may then be saved. Such a record of the call may also include an indication of the Quality of Service provided as well as other parameters related to the call path. Subsequently, the call server
5 sends signaling to the data network to tear down the call path.

Data networking equipment for packet-based telephony can be expensive, not to mention time consuming to maintain. As such, packet-based telephony service providers fill a role by providing packet-based telephony to individuals or enterprises. These service providers typically bill their customers on a per-call basis and, therefore, it is important to the
10 service providers that an accurate record of each call be maintained.

To build a reliable packet-based telephony network, it is desirable to include a backup call server. The backup call server may be used when an active call server fails or when network failure causes the active call server to be unreachable by its supported media gateways at the end of a call, which is when the indication of completion of a call is typically
15 sent from a media gateway to the call server supporting the media gateway.

In some present architectures for telephony over packet networks, when a media gateway cannot communicate with its active call server, control of the media gateway may be switched over to the backup call server. Any calls in progress before the switchover can remain active after the switchover. However, at the end of a call whose control has been
20 switched, the backup call server may not have a record of the beginning the call and therefore may not be able to provide an accurate record of the call for accounting and billing. For service providers that generate revenue on a per call basis, such lost, or inaccurate, records can result in lost revenue.

In a typical solution to this problem, the active call server passes information to the
25 backup call server, typically using a proprietary communications protocol, thus keeping the backup call server updated with information about active calls. However, the performance requirements on the active call server are significant, as much of the communication between the active call server and each media gateway must be repeated to the backup call server. As well, there is a need, in this solution, to maintain a reliable link from the active call server to
30 the backup call server and refresh lost information should the backup call server briefly

disconnect from the active call server. It is generally necessary in this solution that the version of call server software at both the active and backup call servers be equivalent to allow for proper inter-working. This also means that the timing of upgrades to the software may be complex.

5

SUMMARY OF THE INVENTION

10

In a packet-based telephony network, a call server requests information about active media connections from an intelligent media gateway. In particular, this information may be requested by a backup call server to keep the backup call server in a warm standby mode. The backup call server may poll intelligent media gateways to aid in collection of data used to construct a table of information on active media path connections. The polling may be done periodically or only during switchover. After switchover, the backup call server has all necessary details about active media path connections to provide accurate billing information. Additionally, an active call server may recover from a failure by requesting information about active media connections from associated intelligent media gateways.

15

20

Advantageously, the performance requirements of the active call server, necessary to maintain a backup call server, are reduced relative to the solution wherein the active call server passes to the backup server each communication from each media gateway. This reduction in performance requirements at the active call server allows for a higher performance packet-based telephony network. This approach is simpler to implement than existing solutions for maintaining a backup call server as there is no co-ordination required between call servers. Further, both inter-working between various software versions of call servers and software upgrades are simplified.

25

In accordance with an aspect of the present invention there is provided, at a call server in a packet-based telephony network, a method of maintaining a record of an active media connection including sending a request, to a media gateway, for information regarding the active media connection and receiving the information. In another aspect of the invention a call server is provided for performing this method. In a further aspect of the present invention, there is provided a software medium that permits a general purpose computer to carry out this method.

In accordance with another aspect of the present invention there is provided, at a backup call server in a packet-based telephony network, a method of acquiring a record of an active media connection including receiving an indication of a failure of a primary call server, the primary call server, prior to the failure, supporting the active media connection and, responsive to the receiving, sending a request, to a media gateway, for information regarding the active media connection and receiving the information.

In accordance with a further aspect of the present invention there is provided, at a media gateway in a packet-based telephony network, a method of providing a record of an active media connection including receiving, from a call server, a request for information regarding the active media connection and responsive to the request, transmitting information regarding the active media connection to the call server. In another aspect of the invention a media gateway is provided for performing this method. In a further aspect of the present invention, there is provided a software medium that permits a general purpose computer to carry out this method.

In accordance with a still further aspect of the present invention there is provided a packet-based telephony network system including a packet based data network, a telephone station apparatus, a media gateway communicatively connected to the telephone station apparatus and the data network, a primary call server communicatively connected, over the data network, to the media gateway. The packet-based telephony network system also includes a backup call server communicatively connected, over the data network, to the media gateway and operable to send a request, to the media gateway, for information regarding an active media connection terminated at the primary server and receive the information.

In accordance with another aspect of the present invention there is provided a computer data signal embodied in a carrier wave including a request for information regarding an active media connection.

Other aspects and features of the present invention will become apparent to those of ordinary skill in the art upon review of the following description of specific embodiments of the invention in conjunction with the accompanying figures.

BRIEF DESCRIPTION OF THE DRAWINGS

In the figures which illustrate example embodiments of this invention:

FIG. 1 schematically illustrates a packet-based telephony network in which the present invention may be used;

5 FIG. 2 illustrates a call server in accordance with an embodiment of the present invention;

FIG. 3 illustrates an intelligent media gateway in accordance with an embodiment of the present invention; and

FIG. 4 illustrates a table of information on active media path connections in accordance with an embodiment of the present invention.

DETAILED DESCRIPTION

Illustrated in FIG. 1 is a packet-based telephony network system **100** including a number of media gateways **104A**, **104B**, **104C**, **104D** (referenced collectively as **104**), a first call server **106X** and a second call server **106Y**, all connected to a data network **108**. Media gateway **104B** is a typical media gateway and, compared to the “intelligent” media gateways **104A**, **104C** and **104D** which employ an embodiment of the present invention, may be called a dumb media gateway. The media gateways **104** allow connections to be set up between endpoints. Connected to the intelligent media gateway **104A** is a telephone station apparatus **102A**; while connected to the dumb media gateway **104B** is a telephone station apparatus **102B**. A telephone station apparatus **102CA**, along with the telephone station apparatus **102CB** and **102CC**, is connected to a private branch exchange (PBX) **110**, which is connected to the media gateway **102C**.

FIG. 2 illustrates a call server **200** suitable for use in the packet-based telephony network system **100** of FIG. 1. The call server **200** includes a network interface **202** for connecting the call server **200** to the data network **108** (FIG. 1), a processor **204** and a memory **206**. The processor **204** may be loaded with call server software for executing methods exemplary of an embodiment of the present invention from a software medium **210**

that could be a disk, a tape, a chip or a random access memory containing a file downloaded from a remote source.

Turning to FIG. 3, an intelligent media gateway **300** is illustrated which is suitable for use in the packet-based telephony network system **100** of FIG. 1. The intelligent media gateway **300** includes a telephone network interface **316** for connecting the intelligent media gateway **300** to a telephone station apparatus either directly or through a PBX and a data network interface **302** for connecting the intelligent media gateway **300** to the data network **108** (FIG. 1). Further included in intelligent media gateway **300**, and connected to both the data network interface **302** and the telephone network interface **316**, is a digital signal processor (DSP) **304** with an associated memory **306**. A microprocessor **308** has an associated memory **310** and connects to the digital signal processor **304** and the data network interface **302**. The microprocessor **308** may be loaded with media gateway software for executing methods exemplary of an embodiment of the present invention from an associated software medium **314**. The media gateway software media **314** could be disk, tape, chip or random access memory containing a file downloaded from a remote source.

In overview, the intelligent media gateway **104A** maintains a table of information on active media path connections. Upon request, this information may be provided to a call server. There are a number of scenarios wherein this information may be of use to a call server. In a backup scenario, the second call server **106Y** may be configured as a backup for the first call server **106X**. Periodic polling of the intelligent media gateway **104A** provides the second call server **106Y** with an up-to-date record of active media connections such that, should the first call server **106X** become unavailable to the intelligent media gateway **104A**, the second call server **106Y** may assume control of the active media connections at the intelligent media gateway **104A**. In a recovery scenario, the first call server **106X** may recover from a temporary failure by requesting, from the intelligent media gateway **104A**, a table of information on active media path connections.

The backup scenario may transpire, in further detail, as follows. During a given active media path connection in progress between the telephone station apparatus **102A** and the telephone station apparatus **102B**, a network failure causes the active call server, say the first call server **106X**, to be unreachable by the intelligent media gateway **104A**. If the second call server **106Y** has been configured as the backup call server for the first call server **106X**, the

intelligent media gateway **104A** may switchover control of any calls in progress to the second call server **106Y**. In its role as the backup call server for the first call server **106X**, the second call server **106Y** has periodically polled each of the media gateways **104** supported by the first call server **106X**. In response to the polling, each of the media gateways **104**, has
5 provided, to the second call server **106Y**, a table of information regarding ongoing connections. In particular, the intelligent media gateway **104A** has provided information on the given active media path connection. Consequently, after switchover, the second call server **106Y** has all the necessary details about the given active media path connection to save accurate billing information at the completion of the connection. From a performance
10 requirement perspective, this backup scheme has little impact on the intelligent media gateway **104A** and completely relieves the first call server **106X** of any backup functions and consequential performance requirements.

If the intelligent media gateway **104A** is configured to communicate with a call server that is identified by a Fully Qualified Domain Name (FQDN), rather than a network address, use of a Domain Name Server (DNS) may allow the switchover to be transparent from the
15 perspective of the intelligent media gateway **104A**. If the first (active) call server becomes unavailable, the DNS may alter the mapping of the FQDN from address of the first call server **106X** to the address of the second call server **106Y**. Alternatively, both the first call server **106X** and the second call server **106Y** may exist behind a router, where the intelligent media gateway **104A** is configured to point to the network address of the router for call server
20 service. The router then performs Network Address Translation (NAT) and passes communication from the intelligent media gateway **104A** to the appropriate call server, either the active call server or the backup call server.

As will be apparent to a person skilled in the art, the above approach to call server
25 backup is simpler to implement than existing solutions as there is no co-ordination required between call servers. An advantage of obviating the need for co-ordination between call servers is that one call server may backup another call server running a different version of operational software. Because of this allowance of version disparity, software upgrades need not be performed in parallel.

30 Preferably, a standards based interface and protocol are defined to allow a call server to request information from a media gateway. In one embodiment of the present invention,

the data is requested from a media gateway through use of the Simple Network Management Protocol (SNMP). SNMP is a protocol for Internet network management services. It is formally specified in a series of related Internet Engineering Task Force (IETF) Request for Comment (RFC) documents. Network management, using SNMP, is performed on SNMP manageable entities. A collection of objects that describe an SNMP manageable entity is called a Management Information Base (MIB). Many MIBs have been defined for various network management services and yet more may be defined in future. Use of SNMP would enable wide spread deployment of the capability to provide information on active media connections to widely varied media gateway platforms. This technique could be employed in networks that use any of the current set of packet-based telephony network protocols (MGCP, MEGACO, SIP, H.323).

Using SNMP as an example, the second call server **106Y**, acting as a backup call server, polls the intelligent media gateways **104A** with a "getActiveConnection" MIB and receives in return a table of information on all active media connections in MIB format. From "Management Information Base for the Simple Network Management Protocol" draft-ietf-snmpv3-update-mib-03.txt, an exemplary MIB definition follows:

```
sysUpTime
    OBJECT-TYPE SYNTAX      TimeTicks
    MAX-ACCESS              read-only
    STATUS                   current
    DESCRIPTION
        "The time (in hundredths of a second) since the
        network management portion of the system was last
        re-initialized."
    ::= { system 3 }
```

According to the present invention, each media gateway **104** has a record of calls in progress. An exemplary record **400** is illustrated in FIG. 4 and may include information such as: Called IP Address; Calling IP Address; Call Reference Number; Called Number; Calling Number; Quality of Service; Type Of Call (Coding Algorithm); Time Call Has Been Active; Number of Packets Sent; Number of Packets Received and a measure of Lost Packets (say, a percentage). The exemplary record **400** includes the Called Number and Calling Number, as well as a network address for identification of each of the destination and sending endpoints. Alternatively, much of the information that may be stored in the exemplary record **400** may be encoded in an "Intelligent Call ID." Such an Intelligent Call ID may include such information as: an indication of whether the call is incoming or outgoing at the particular

endpoint; IP Address of the media gateway to which the endpoint connects; timeslot number; and a unique ID between 0 and FFFF. Where the timeslot number may be necessary when the data network **108**, through which the media gateways **104** connect, uses time division multiplexing.

5 Alternate interfaces and protocols are available to allow a call server to request information from a media gateway through extensions to existing signaling protocols such as: MGCP; MEGACO; SIP; or H.323:

- 10 • MGCP (Media Gateway Control Protocol) is an application programming interface and a corresponding protocol (MGCP) for controlling Voice over IP (VoIP) media gateways (such as the dumb media gateway **104B**) from external call control elements (such as the call server **106Y**). MGCP assumes a call control architecture where the call control “intelligence” is outside the media gateways and handled by external call control elements. For more information, see “Media Gateway Control Protocol (MGCP) Version 1.0” (IETF RFC 2705).
- 15 • Megaco defines the protocols used between elements of a physically decomposed multimedia media gateway. There are no functional differences from a system view between a decomposed media gateway, with distributed sub-components potentially on more than one physical device, and a monolithic media gateway. For a general framework of these protocols, see “Megaco Protocol Version 0.8” (IETF RFC 2885).
- 20 • The Session Initiation Protocol (SIP) is an application-layer control (signaling) protocol for creating, modifying and terminating sessions with one or more participants. These sessions include Internet multimedia conferences, Internet telephone calls and multimedia distribution. Members in a session can communicate via multicast or via a mesh of unicast relations, or a combination of these. SIP invitations used to create sessions carry
25 session descriptions that allow participants to agree on a set of compatible media types. SIP supports user mobility by proxying and redirecting requests to the user’s current location. Users can register their current location. SIP is not tied to any particular conference control protocol. SIP is designed to be independent of the lower-layer transport protocol and can be extended with additional capabilities. For more information,
30 see “SIP: Session Initiation Protocol” (IETF RFC 2543).

- In May 1996, the International Telecommunications Union Telecommunication Standardization Bureau (ITU-T) ratified a specification (H.323), which defines how voice, data, and video traffic will be transported over IP-based local area networks. The recommendation is based on the real-time protocol/real-time control protocol (RTP/RTCP) for managing audio and video signals.

Considering the intelligent media gateway **300** of FIG. 3, the telephone network interface **316** either connects directly to a telephone device or connects to a hub, such as a private branch exchange (PBX) **110**, that connects to a number of telephone devices. As well, the signal arriving at the telephone network interface **316** may be analogue or digital. In either case, appropriate interfaces are well known in the art.

The DSP **304** functions to process voice signals received at the telephone network interface **316**. This processing may include digitizing the voice signals, if the voice signals are not already digital signals. The processing may further include compressing the digital voice signals using one of many known audio compression standards, e.g., G.711, G.723 or G.729 from the ITU-T. The DSP **304** may also function to packetize the digital voice signals.

The microprocessor **308** functions to maintain active media connection information and provide this active media connection information to a call server on request. Necessarily, the microprocessor **308** can communicate with elements of the network using the appropriate signaling protocol. For instance, the microprocessor **308** may receive a request, via the data network interface **302**, in SNMP format. In response, the microprocessor **308** may transmit a MIB.

Where the link from the intelligent media gateway **300** to the data network **108** comprises an Integrated Service Digital Network (ISDN) connection, the link may be considered to comprise channels for exchanging signaling (D-channels) and channels for transmitting and receiving media (B-channels). In such a case, the microprocessor **308** may perform the following two gateway functions: a Media Gateway function, having direct access and immediate control over B-channels and associated media channel features; and a Signaling Gateway function having direct access and control over D-channel Layer 1, the Signaling Gateway function may also process (i.e., terminate) signaling that uses the ISDN Layer 2 (i.e., Q.921) protocol. Alternatively, the intelligent media gateway **300** may

communicate with the first call server **106X** by transporting common channel signaling (CCS).

If the data network **108** (FIG. 1) is the Internet, or uses the Internet Protocol (IP), packets output from the intelligent media gateway **300** will have to conform to the Internet Protocol. Such conformation is typically provided by an "IP stack" processing. The IP stack processing may be implemented in the intelligent media gateway **300** in at least two schemes. In the first scheme, called software forwarding, the IP stack processing is performed by the microprocessor **308**. Digital voice signals pass from the DSP **304** to the microprocessor **308** and, after some processing, IP packets are passed to the data network interface and subsequently to the data network **108**. In the second scheme, called hardware forwarding, the IP stack processing is performed by the DSP **304**. IP packets are created from the digital voice signals within the DSP **304** and passed directly to the data network interface **304**, which forwards the IP packets on to the data network **108**.

As will be appreciated, a single device may combine an intelligent media gateway, such as the intelligent media gateway **300** of FIG. 3, with a telephone station apparatus. Such a combination is provided in FIG. 1 as combination intelligent media gateway and telephone station **104D**.

Other modifications will be apparent to those skilled in the art and, therefore, the invention is defined in the claims.

We claim:

- 1 1. At a call server in a packet-based telephony network, a method of maintaining a record of
2 an active media connection comprising:
 - 3 sending a request, to a media gateway, for information regarding said active media
4 connection; and
 - 5 receiving said information.
- 1 2. The method of claim 1 wherein said sending comprises formulating said request using a
2 network management protocol.
- 1 3. The method of claim 2 wherein said network management protocol is the Simple
2 Network Management Protocol.
- 1 4. The method of claim 2 wherein said network management protocol is the Media Gateway
2 Control Protocol.
- 1 5. The method of claim 2 wherein said network management protocol is the Session
2 Initiation Protocol.
- 1 6. The method of claim 1 further comprising storing said received information in a memory.
- 1 7. The method of claim 1 further comprising repeating said sending at a predetermined
2 interval.
- 1 8. The method of claim 1 wherein said received information includes an identification of a
2 device originating said active media connection.
- 1 9. The method of claim 1 wherein said received information includes an indication of a
2 duration of time said active media connection has been active.
- 1 10. The method of claim 1 wherein said received information includes an indication of a
2 coding algorithm used for said active media connection.
- 1 11. The method of claim 1 wherein said received information includes an indication of
2 Quality of Service setting associated with said active media connection.

1 12. A call server operable to:

2 send a request, to a media media gateway, for information regarding an active media
3 connection; and
4 receive said information.

1 13. A computer readable medium containing computer-executable instructions which, when
2 performed by a processor in a call server in a packet-based telephony network, cause the
3 processor to:

4 send a request, to a media gateway, for information regarding an active media
5 connection; and
6 receive said information.

1 14. At a backup call server in a packet-based telephony network, a method of acquiring a
2 record of an active media connection comprising:

3 receiving an indication of a failure of a primary call server, said primary call server,
4 prior to said failure, supporting said active media connection;
5 responsive to said receiving, sending a request, to a media gateway, for information
6 regarding said active media connection; and
7 receiving said information.

1 15. At a media gateway in a packet-based telephony network, a method of providing a record
2 of an active media connection comprising:

3 receiving, from a call server, a request for information regarding said active media
4 connection; and
5 responsive to said request, transmitting information regarding said active media
6 connection to said call server.

1 16. The method of claim 15 wherein said request is received using the Simple Network
2 Management Protocol.

1 17. The method of claim 15 wherein said transmitted information includes a network address
2 of a device originating said active media connection.

1 18. The method of claim 15 wherein said transmitted information includes an indication of a
2 duration of time said active media connection has been active.

1 19. The method of claim 15 wherein said transmitted information includes an indication of a
2 coding algorithm used for said active media connection.

1 20. The method of claim 15 wherein said transmitted information includes an indication of
2 Quality of Service setting associated with said active media connection.

1 /21. A first media gateway comprising:

2 a receiver for receiving an incoming media flow;

3 a digital signal processor communicatively connected to said receiver for processing
4 said media flow;

5 a transmitter communicatively connected to said digital signal processor for
6 transmitting said media flow to a second media gateway;

7 a processor operable to:

8 receive, from a call server, a request for information regarding said media
9 flow; and

10 responsive to said request, transmit information regarding said media flow to
11 said call server.

1 /22. A computer readable medium containing computer-executable instructions which, when
2 performed by a processor in a media gateway, cause the processor to:

3 receive, from a call server, a request for information regarding an active media
4 connection; and

5 responsive to said request, transmit information regarding said active media
6 connection to said call server.

1 23. A packet-based telephony network system comprising:

2 a packet based data network;

3 a telephone station apparatus;

4 a media gateway communicatively connected to said telephone station apparatus and
5 said data network;

6 a primary call server communicatively connected, over said data network, to said
7 media gateway; and

8 a backup call server communicatively connected, over said data network, to said
9 media gateway and operable to:

10 send a request, to said media gateway, for information regarding an active
11 media connection terminated at said primary server; and

12 receive said information.

1 24. A computer data signal embodied in a carrier wave comprising a request for information
2 regarding an active media connection.

ABSTRACT OF THE DISCLOSURE

In a packet-based telephony network, a media gateway provides information on active media path connections to an active call server. For instance, this data may be provided to a backup call server to keep the backup call server in a warm standby mode. The backup call server polls a media gateway to retrieve a table of information on active media path connections. The polling may be done periodically or only during switchover from the active call server to the backup call server. After switchover, the backup call server has all necessary details about active media path connections to provide accurate billing information. Alternatively, after a temporary failure at the active call server, the active call server may send a request to the media gateway to retrieve a table of information on active media path connections.

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60
61
62
63
64
65
66
67
68
69
70
71
72
73
74
75
76
77
78
79
80
81
82
83
84
85
86
87
88
89
90
91
92
93
94
95
96
97
98
99
100
101
102
103
104
105
106
107
108
109
110
111
112
113
114
115
116
117
118
119
120
121
122
123
124
125
126
127
128
129
130
131
132
133
134
135
136
137
138
139
140
141
142
143
144
145
146
147
148
149
150
151
152
153
154
155
156
157
158
159
160
161
162
163
164
165
166
167
168
169
170
171
172
173
174
175
176
177
178
179
180
181
182
183
184
185
186
187
188
189
190
191
192
193
194
195
196
197
198
199
200
201
202
203
204
205
206
207
208
209
210
211
212
213
214
215
216
217
218
219
220
221
222
223
224
225
226
227
228
229
230
231
232
233
234
235
236
237
238
239
240
241
242
243
244
245
246
247
248
249
250
251
252
253
254
255
256
257
258
259
260
261
262
263
264
265
266
267
268
269
270
271
272
273
274
275
276
277
278
279
280
281
282
283
284
285
286
287
288
289
290
291
292
293
294
295
296
297
298
299
300
301
302
303
304
305
306
307
308
309
310
311
312
313
314
315
316
317
318
319
320
321
322
323
324
325
326
327
328
329
330
331
332
333
334
335
336
337
338
339
340
341
342
343
344
345
346
347
348
349
350
351
352
353
354
355
356
357
358
359
360
361
362
363
364
365
366
367
368
369
370
371
372
373
374
375
376
377
378
379
380
381
382
383
384
385
386
387
388
389
390
391
392
393
394
395
396
397
398
399
400
401
402
403
404
405
406
407
408
409
410
411
412
413
414
415
416
417
418
419
420
421
422
423
424
425
426
427
428
429
430
431
432
433
434
435
436
437
438
439
440
441
442
443
444
445
446
447
448
449
450
451
452
453
454
455
456
457
458
459
460
461
462
463
464
465
466
467
468
469
470
471
472
473
474
475
476
477
478
479
480
481
482
483
484
485
486
487
488
489
490
491
492
493
494
495
496
497
498
499
500
501
502
503
504
505
506
507
508
509
510
511
512
513
514
515
516
517
518
519
520
521
522
523
524
525
526
527
528
529
530
531
532
533
534
535
536
537
538
539
540
541
542
543
544
545
546
547
548
549
550
551
552
553
554
555
556
557
558
559
560
561
562
563
564
565
566
567
568
569
570
571
572
573
574
575
576
577
578
579
580
581
582
583
584
585
586
587
588
589
590
591
592
593
594
595
596
597
598
599
600
601
602
603
604
605
606
607
608
609
610
611
612
613
614
615
616
617
618
619
620
621
622
623
624
625
626
627
628
629
630
631
632
633
634
635
636
637
638
639
640
641
642
643
644
645
646
647
648
649
650
651
652
653
654
655
656
657
658
659
660
661
662
663
664
665
666
667
668
669
670
671
672
673
674
675
676
677
678
679
680
681
682
683
684
685
686
687
688
689
690
691
692
693
694
695
696
697
698
699
700
701
702
703
704
705
706
707
708
709
710
711
712
713
714
715
716
717
718
719
720
721
722
723
724
725
726
727
728
729
730
731
732
733
734
735
736
737
738
739
740
741
742
743
744
745
746
747
748
749
750
751
752
753
754
755
756
757
758
759
760
761
762
763
764
765
766
767
768
769
770
771
772
773
774
775
776
777
778
779
780
781
782
783
784
785
786
787
788
789
790
791
792
793
794
795
796
797
798
799
800
801
802
803
804
805
806
807
808
809
810
811
812
813
814
815
816
817
818
819
820
821
822
823
824
825
826
827
828
829
830
831
832
833
834
835
836
837
838
839
840
841
842
843
844
845
846
847
848
849
850
851
852
853
854
855
856
857
858
859
860
861
862
863
864
865
866
867
868
869
870
871
872
873
874
875
876
877
878
879
880
881
882
883
884
885
886
887
888
889
890
891
892
893
894
895
896
897
898
899
900
901
902
903
904
905
906
907
908
909
910
911
912
913
914
915
916
917
918
919
920
921
922
923
924
925
926
927
928
929
930
931
932
933
934
935
936
937
938
939
940
941
942
943
944
945
946
947
948
949
950
951
952
953
954
955
956
957
958
959
960
961
962
963
964
965
966
967
968
969
970
971
972
973
974
975
976
977
978
979
980
981
982
983
984
985
986
987
988
989
990
991
992
993
994
995
996
997
998
999
1000
1001
1002
1003
1004
1005
1006
1007
1008
1009
1010
1011
1012
1013
1014
1015
1016
1017
1018
1019
1020
1021
1022
1023
1024
1025
1026
1027
1028
1029
1030
1031
1032
1033
1034
1035
1036
1037
1038
1039
1040
1041
1042
1043
1044
1045
1046
1047
1048
1049
1050
1051
1052
1053
1054
1055
1056
1057
1058
1059
1060
1061
1062
1063
1064
1065
1066
1067
1068
1069
1070
1071
1072
1073
1074
1075
1076
1077
1078
1079
1080
1081
1082
1083
1084
1085
1086
1087
1088
1089
1090
1091
1092
1093
1094
1095
1096
1097
1098
1099
1100
1101
1102
1103
1104
1105
1106
1107
1108
1109
1110
1111
1112
1113
1114
1115
1116
1117
1118
1119
1120
1121
1122
1123
1124
1125
1126
1127
1128
1129
1130
1131
1132
1133
1134
1135
1136
1137
1138
1139
1140
1141
1142
1143
1144
1145
1146
1147
1148
1149
1150
1151
1152
1153
1154
1155
1156
1157
1158
1159
1160
1161
1162
1163
1164
1165
1166
1167
1168
1169
1170
1171
1172
1173
1174
1175
1176
1177
1178
1179
1180
1181
1182
1183
1184
1185
1186
1187
1188
1189
1190
1191
1192
1193
1194
1195
1196
1197
1198
1199
1200
1201
1202
1203
1204
1205
1206
1207
1208
1209
1210
1211
1212
1213
1214
1215
1216
1217
1218
1219
1220
1221
1222
1223
1224
1225
1226
1227
1228
1229
1230
1231
1232
1233
1234
1235
1236
1237
1238
1239
1240
1241
1242
1243
1244
1245
1246
1247
1248
1249
1250
1251
1252
1253
1254
1255
1256
1257
1258
1259
1260
1261
1262
1263
1264
1265
1266
1267
1268
1269
1270
1271
1272
1273
1274
1275
1276
1277
1278
1279
1280
1281
1282
1283
1284
1285
1286
1287
1288
1289
1290
1291
1292
1293
1294
1295
1296
1297
1298
1299
1300
1301
1302
1303
1304
1305
1306
1307
1308
1309
1310
1311
1312
1313
1314
1315
1316
1317
1318
1319
1320
1321
1322
1323
1324
1325
1326
1327
1328
1329
1330
1331
1332
1333
1334
1335
1336
1337
1338
1339
1340
1341
1342
1343
1344
1345
1346
1347
1348
1349
1350
1351
1352
1353
1354
1355
1356
1357
1358
1359
1360
1361
1362
1363
1364
1365
1366
1367
1368
1369
1370
1371
1372
1373
1374
1375
1376
1377
1378
1379
1380
1381
1382
1383
1384
1385
1386
1387
1388
1389
1390
1391
1392
1393
1394
1395
1396
1397
1398
1399
1400
1401
1402
1403
1404
1405
1406
1407
1408
1409
1410
1411
1412
1413
1414
1415
1416
1417
1418
1419
1420
1421
1422
1423
1424
1425
1426
1427
1428
1429
1430
1431
1432
1433
1434
1435
1436
1437
1438
1439
1440
1441
1442
1443
1444
1445
1446
1447
1448
1449
1450
1451
1452
1453
1454
1455
1456
1457
1458
1459
1460
1461
1462
1463
1464
1465
1466
1467
1468
1469
1470
1471
1472
1473
1474
1475
1476
1477
1478
1479
1480
1481
1482
1483
1484
1485
1486
1487
1488
1489
1490
1491
1492
1493
1494
1495
1496
1497
1498
1499
1500
1501
1502
1503
1504
1505
1506
1507
1508
1509
1510
1511
1512
1513
1514
1515
1516
1517
1518
1519
1520
1521
1522
1523
1524
1525
1526
1527
1528
1529
1530
1531
1532
1533
1534
1535
1536
1537
1538
1539
1540
1541
1542
1543
1544
1545
1546
1547
1548
1549
1550
1551
1552
1553
1554
1555
1556
1557
1558
1559
1560
1561
1562
1563
1564
1565
1566
1567
1568
1569
1570
1571
1572
1573
1574
1575
1576
1577
1578
1579
1580
1581
1582
1583
1584
1585
1586
1587
1588
1589
1590
1591
1592
1593
1594
1595
1596
1597
1598
1599
1600
1601
1602
1603
1604
1605
1606
1607
1608
1609
1610
1611
1612
1613
1614
1615
1616
1617
1618
1619
1620
1621
1622
1623
1624
1625
1626
1627
1628
1629
1630
1631
1632
1633
1634
1635
1636
1637
1638
1639
1640
1641
1642
1643
1644
1645
1646
1647
1648
1649
1650
1651
1652
1653
1654
1655
1656
1657
1658
1659
1660
1661
1662
1663
1664
1665
1666
1667
1668
1669
1670
1671
1672
1673
1674
1675
1676
1677
1678
1679
1680
1681
1682
1683
1684
1685
1686
1687
1688
1689
1690
1691
1692
1693
1694
1695
1696
1697
1698
1699
1700
1701
1702
1703
1704
1705
1706
1707
1708
1709
1710
1711
1712
1713
1714
1715
1716
1717
1718
1719
1720
1721
1722
1723
1724
1725
1726
1727
1728
1729
1730
1731
1732
1733
1734
1735
1736
1737
1738
1739
1740
1741
1742
1743
1744
1745
1746
1747
1748
1749
1750
1751
1752
1753
1754
1755
1756
1757
1758
1759
1760
1761
1762
1763
1764
1765
1766
1767
1768
1769
1770
1771
1772
1773
1774
1775
1776
1777
1778
1779
1780
1781
1782
1783
1784
1785
1786
1787
1788
1789
1790
1791
1792
1793
1794
1795
1796
1797
1798
1799
1800
1801
1802
1803
1804
1805
1806
1807
1808
1809
1810
1811
1812
1813
1814
1815
1816
1817
1818
1819
1820
1821
1822
1823
1824
1825
1826
1827
1828
1829
1830
1831
1832
1833
1834
1835
1836
1837
1838
1839
1840
1841
1842
1843
1844
1845
1846
1847
1848
1849
1850
1851
1852
1853
1854
1855
1856
1857
1858
1859
1860
1861
1862
1863
1864
1865
1866
1867
1868
1869
1870
1871
1872
1873
1874
1875
1876
1877
1878
1879
1880
1881
1882
1883
1884
1885
1886
1887
1888
1889
1890
1891
1892
1893
1894
1895
1896
1897
1898
1899
1900
1901
1902
1903
1904
1905
1906
1907
1908
1909
1910
1911
1912
1913
1914
1915
1916
1917
1918
1919
1920
1921
1922
1923
1924
1925
1926
1927
1928
1929
1930
1931
1932
1933
1934
1935
1936
1937
1938
1939
1940
1941
1942
1943
1944
1945
1946
1947
1948
1949
1950
1951
1952
1953
1954
1955
1956
1957
1958
1959
1960
1961
1962
1963
1964
1965
1966
1967
1968
1969
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
2025
2026
2027
2028
2029
2030
2031
2032
2033
2034
2035
2036
2037
2038
2039
2040
2041
2042
2043
2044
2045
2046
2047
2048
2049
2050
2051
2052
2053
2054
2055
2056
2057
2058
2059
2060
2061
2062
2063
2064
2065
2066
2067
2068
2069
2070
2071
2072
2073
2074
2075
2076
2077
2078
2079
2080
2081
2082
2083
2084
2085
2086
2087
2088
2089
2090
2091
2092
2093
2094
2095
2096
2097
2098
2099
2100
2101
2102
2103
2104
2105
2106
2107
2108
2109
2110
2111
2112
2113
2114
2115
2116
2117
2118
2119
2120
2121
2122
2123
2124
2125
2126
2127
2128
2129
2130
2131
2132
2133
2134
2135
2136
2137
2138
2139
2140
2141
2142
2143
2144
2145
2146
2147
2148
2149
2150
2151
2152
2153
2154
2155
2156
2157
2158
2159
2160
2161
2162
2163
2164
2165
2166
2167
2168
2169
2170
2171
2172
2173
2174
2175
2176
2177
2178
2179
2180
2181
2182
2183
2184
2185
2186
2187
2188
2189
2190
2191
2192
2193
2194
2195
219

FIG. 1 is a block diagram of a network system 100. The system 100 includes a data network 108, a combination intelligent media gateway and telephone station 104D, two call servers 106X and 106Y, an intelligent media gateway 104A, a dumb media gateway 104B, a PBX 110, and three intelligent media gateways 104C. The data network 108 is connected to the combination intelligent media gateway and telephone station 104D, the two call servers 106X and 106Y, the intelligent media gateway 104A, and the dumb media gateway 104B. The PBX 110 is connected to the intelligent media gateway 104C and the three intelligent media gateways 104C. The three intelligent media gateways 104C are each connected to a telephone 102A, 102B, and 102C. The intelligent media gateway 104A is connected to a telephone 102A. The dumb media gateway 104B is connected to a telephone 102B. The combination intelligent media gateway and telephone station 104D is connected to a telephone 102C.

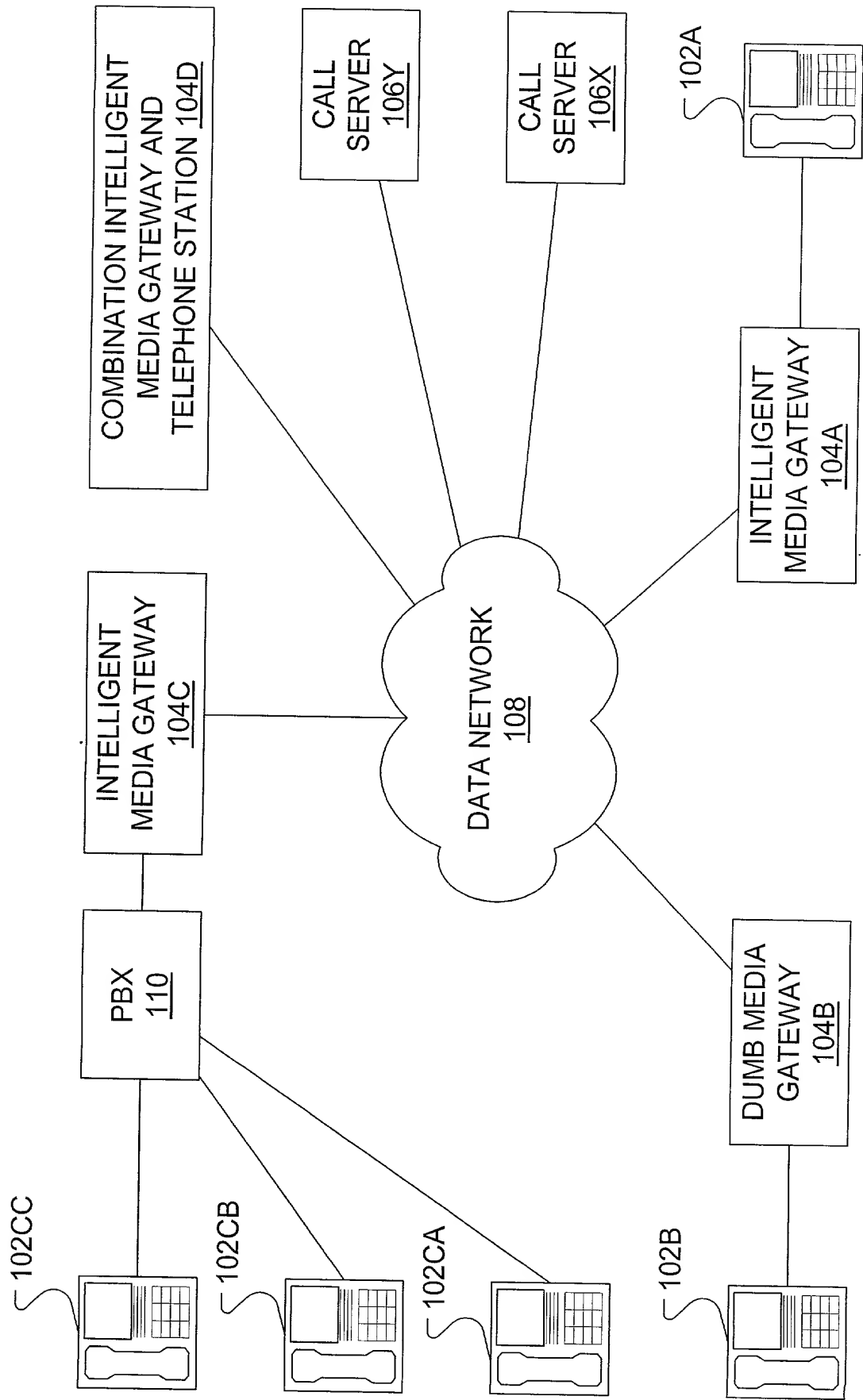


FIG. 1

FIG. 2 is a block diagram of a call server 200.

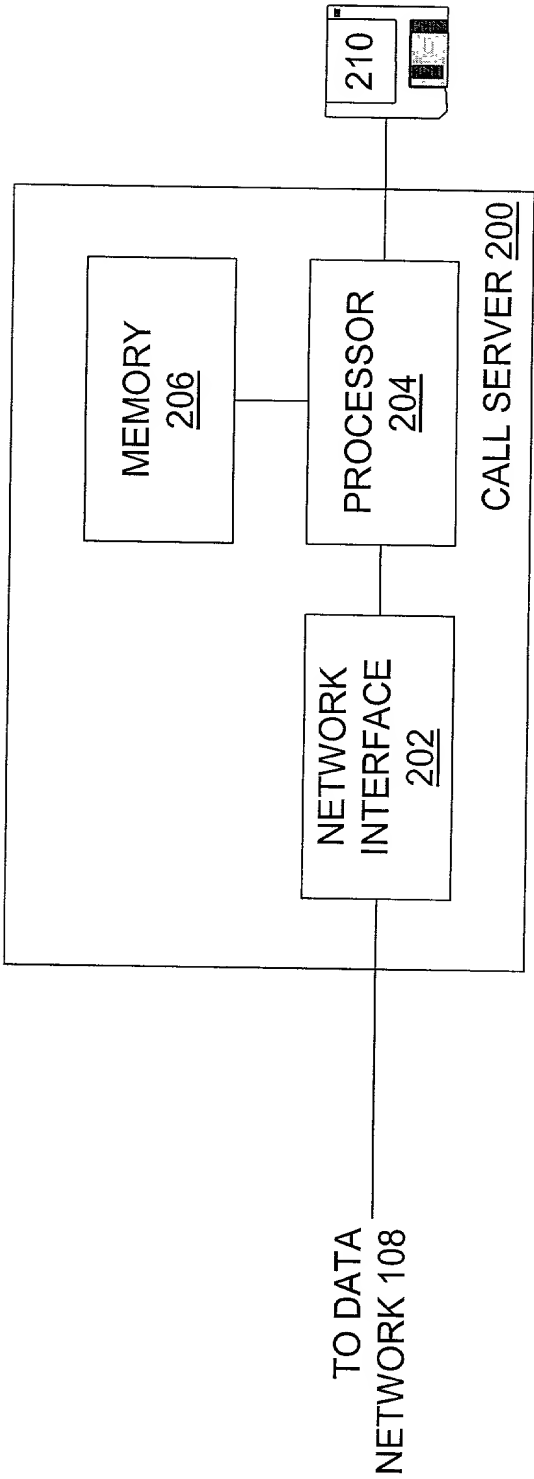


FIG. 2

FIG. 3 is a block diagram of an intelligent media gateway 300.

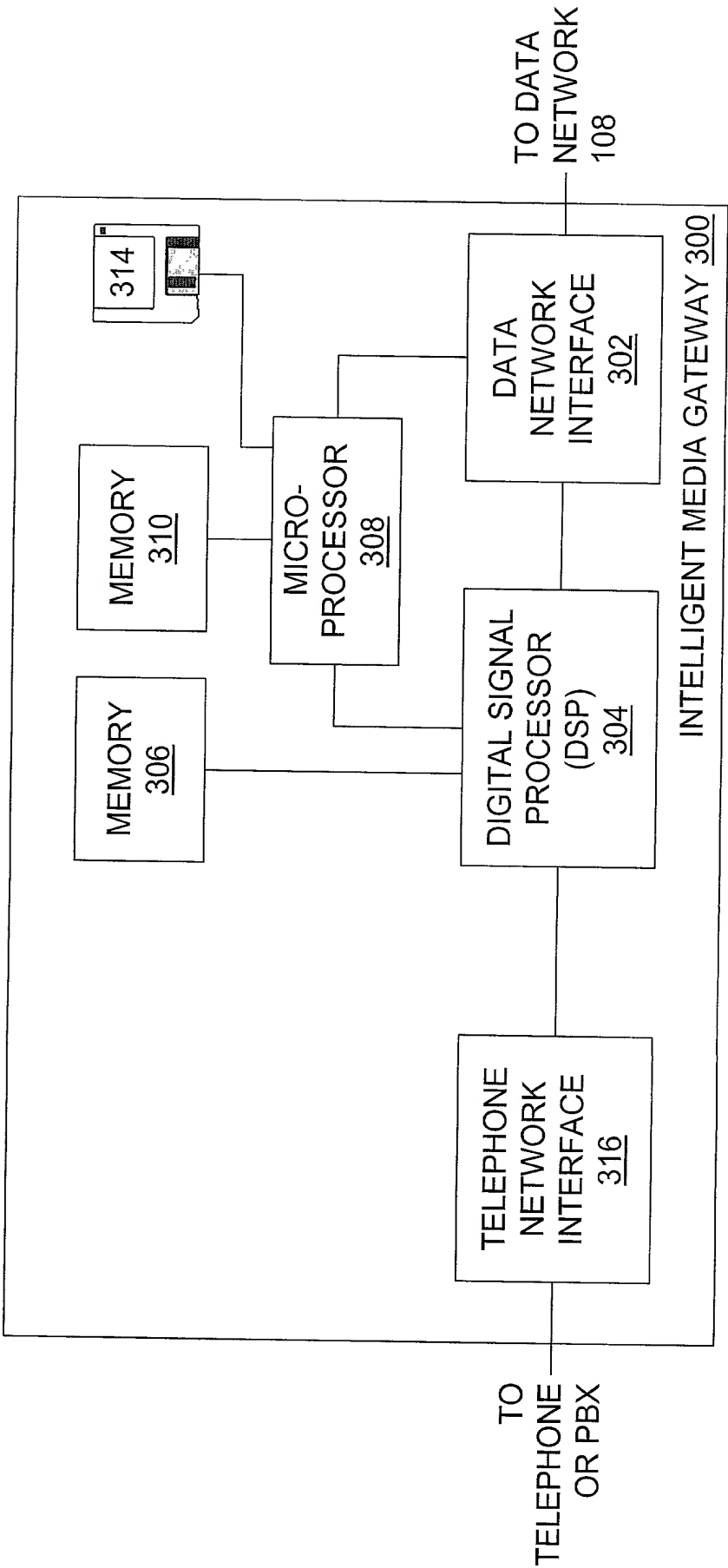


FIG. 3

FIG. 4B and FIG. 4C are schematic diagrams of a system for providing a service to a user.

400 ↗

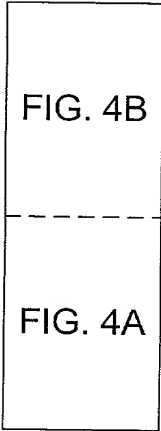


FIG. 4

CALLED IP ADDRESS	CALLING IP ADDRESS	CALL REFERENCE NUMBER	CALLED NUMBER	CALLING NUMBER	QUALITY OF SERVICE
10.0.0.1	10.0.0.4	123456	(416)967-1111	(905)738-5194	MAXIMIZE RELIABILITY
192.68.0.1	49.63.35.7	456789	(416)555-1234	(416)555-5678	MINIMIZE DELAY
24.48.16.2	27.45.162.9	718293	(416)555-9874	(416)555-5632	MINIMIZE COST

FIG. 4A

FIG. 4B is a flowchart illustrating a method for determining a quality of service (QoS) metric for a call. The method includes: receiving a call; determining a type of call; determining a time call has been active; determining a number of packets sent; determining a number of packets received; and determining a lost packets (percent).

400 ↗

TYPE OF CALL (CODING ALGORITHM)	TIME CALL HAS BEEN ACTIVE	NUMBER OF PACKETS SENT	NUMBER OF PACKETS RECEIVED	LOST PACKETS (PERCENT)
VOICE (G.711)	01:15:03.34	69,671,111	69,531,769	0.2%
VIDEO (H.261)	00:28:36.29	165,551,234	164,889,029	0.4%
FAX (TIFF)	00:06:54.78	559,874	554,275	1.0%

FIG. 4B

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
COMBINED DECLARATION AND POWER OF ATTORNEY**

As a below named inventor, I hereby declare that: my residence, post office address and citizenship are as stated below next to my name; that I verily believe that I am the original, first and sole inventor (if only one name is listed below) or a joint inventor (if plural inventors are named below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

MEDIA GATEWAY CONNECTION INFORMATION RECOVERY

the specification of which

(check one) ☒ is attached hereto.

☐ was filed on _____
as U.S. Application Serial No. _____.

☐ was filed on _____
as PCT International Application No. PCT / _____.

and (if applicable) was amended on _____.

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information known to me which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, §§ 1.56(a) and (b), which state:

"(a) A patent by its very nature is affected with a public interest. The public interest is best served, and the most effective patent examination occurs when, at the time an application is being examined, the Office is aware of and evaluates the teachings of all information material to patentability. Each individual associated with the filing and prosecution of a patent application has a duty of candor and good faith in dealing with the Office, which includes a duty to disclose to the Office all information known to that individual to be material to patentability as defined in this section. The duty to disclose information exists with respect to each pending claim until the claim is cancelled or withdrawn from consideration, or the application becomes abandoned. Information material to the patentability that is cancelled or withdrawn from consideration need not be submitted if the information is not material to the patentability of any claim remaining under consideration in the application. There is no duty to submit information which is not material to the patentability of any existing claim. The duty to disclose all information known to be material to patentability is deemed to be satisfied if all information known to be material to patentability of any claim issued in a patent was cited by the Office or submitted to the Office in the manner prescribed by §§ 1.97(b)-(d) and 1.98. However, no patent will be granted on an application in connection with which fraud on the Office was practised or attempted or the duty of disclosure was violated through bad faith or intentional misconduct. The Office encourages applicants to carefully examine:

- (1) prior art cited in search reports of a foreign patent office in a counterpart application,
- (2) the closest information over which individuals associated with the filing or prosecution of a patent application believe any pending claim patentably defines, to make sure that any material information contained therein is disclosed to the Office.

(b) Under this section, information is material to patentability when it is not cumulative to

information already of record or being made of record in the application, and

- (1) It establishes, by itself or in combination with other information, a prima facie case of unpatentability of a claim; or
- (2) It refutes, or is inconsistent with, a position the applicant takes in:
 - (I) Opposing an argument of unpatentability relied on by the Office, or
 - (ii) Asserting an argument of patentability.

A prima facie case of unpatentability is established when the information compels a conclusion that a claim is unpatentable under the preponderance of evidence, burden-of-proof standard, giving each term in the claim its broadest reasonable construction consistent with the specification, and before any consideration is given to evidence which may be submitted in an attempt to establish a contrary conclusion of patentability."

I hereby claim foreign priority benefits under 35 United States Code, § 119 and/or § 365 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate filed by me or my assignee disclosing the subject matter claimed in this application and having a filing date (1) before that of the application on which priority is claimed, or (2) if no priority claimed, before the filing of this application:

PRIOR FOREIGN APPLICATION(S)

<u>Number</u>	<u>Country</u>	<u>Filing Date</u> <i>(Day/Month/Year)</i>	<u>Date First</u> <u>Laid-open or</u> <u>Published</u>	<u>Date</u> <u>Patented</u> <u>or Granted</u>	<u>Priority</u> <u>Claimed?</u>
---------------	----------------	---	--	---	------------------------------------

none

I hereby claim the benefit under 35 United States Code, § 119(e) of any United States provisional application(s) listed below:

<u>Application Number</u>	<u>Filing Date</u>
---------------------------	--------------------

none

I hereby claim the benefit under Title 35, United States Code, §120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, §112, I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, §1.56(a) which became available between the filing date of the prior application and the national or PCT international filing date of this application:

PRIOR U.S. OR PCT APPLICATION(S)

<u>Application No.</u>	<u>Filing Date</u> <i>(day/month/year)</i>	<u>Status</u> <i>(pending, abandoned, granted)</i>
------------------------	---	---

none

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that wilful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such wilful false statements may jeopardize the validity of the application or any patent issued thereon.

I hereby appoint the following patent agents with full power of substitution, association and revocation to prosecute this application and/or international application and to transact all business in the Patent and Trademark Office connected therewith:

JOHN R. MORRISSEY (Reg. No. 28585)
KELTIE R. SIM (Reg. No. 34535)
ALISTAIR G. SIMPSON (Reg. No. 37040)
MATTHEW ZISCHKA (Reg. No. 41575)

GUNARS GAIKIS (Reg. No. 32811)
RONALD D. FAGGETTER (Reg. No. 33345)
YOON KANG (Reg. No. 40386)
YWE LOOPER (Reg. No. 43758)

PLEASE SEND CORRESPONDENCE TO: **Customer No. 22463**

SMART & BIGGAR
438 University Avenue
Suite 1500, Box 111
Toronto, Ontario
M5G 2K8 CANADA

Attention: Ronald D. Faggetter

Telephone: (416) 593-5514
Facsimile: (416) 591-1690

1) INVENTOR'S SIGNATURE: John C. Lynch Date: 00/09/27

Inventor's Name: John C. Lynch
(First) (Middle Initial) (Family Name)

Country of Citizenship: Canada

Residence: Belleville, Ontario, Canada
(City, Province, Country)

Post Office Address: 6 Beverley Cres., Belleville, Ontario, Canada, K8P 4W5

2) INVENTOR'S SIGNATURE:  Date: Sept 27, 2000

Inventor's Name: Pierre Couillaud
(First) (Middle Initial) (Family Name)

Country of Citizenship: Canada

Residence: Belleville, Ontario, Canada
(City, Province, Country)

Post Office Address: Apt 207-236 West Moira Street, Belleville, Ontario, Canada, K8P 1T6

3) INVENTOR'S SIGNATURE:  Date: Sept. 25/2000

Inventor's Name: Metodej E. Valentik
(First) (Middle Initial) (Family Name)

Country of Citizenship: Canada

Residence: Belleville, Ontario, Canada
(City, Province, Country)

Post Office Address: R.R. #5 Belleville, Ontario, Canada, K8N 4Z5

91436-284 (Case 12459ABUS01U)